**COMPARISON OF COSMOGENIC NOBLE GASES IN SILICATES AND THE METAL PHASE OF IAB IRONS.** N. Vogel[1] and I. Leya[1], [1]Institute of Physics, Sidlerstrasse 5, University of Berne, Switzerland, email: nvogel@space.unibe.ch.

**Introduction:** Cosmogenic noble gases are produced by the interaction of primary and secondary cosmic ray particles with meteoritic target material in space. As the concentrations of stable cosmogenic noble gases in a meteorite are correlated with the duration of cosmic ray exposure, they are widely used to determine cosmic ray exposure ages (CREA) of meteorites [see, e.g., 1, for a comprehensive review]. CREAS are calculated using experimentally determined production rates [e.g., 2], or those modelled predominantly based on physical principles [e.g., 3, 4]. Knowledge about the duration of irradiation with cosmic rays helps for example unravelling meteoroid transfer times to Earth [see, e.g., 1, for a comprehensive review] and are indispensable for the decision to which degree a small excess of the daughter isotope of an extinct radionuclide is to be attributed to its existence in the early solar system or if it has been produced by irradiation with cosmic rays later in the history of the meteoroid [e.g., 5, 6].

Besides the cosmic ray flux, the production rates for cosmogenic nuclides depend on the target chemistry, target geometry, and the location of the sample of interest within its parent meteoroid.

Best known are the production rates for stony meteorites, but also reliable data exist for the main target elements in iron meteorites, Fe and Ni [e.g., 1, 3, 4]. However, production rates (modelled or experimentally determined) are sparse for meteorites consisting of macroscopic silicate inclusions embedded in a metal groundmass as for example IAB irons. We are anticipating a study in which cosmogenic noble gases will be analyzed in silicate separates of IAB silicate inclusions as well as from the surrounding Fe, Ni groundmass. Differences in the concentrations and isotopic ratios of cosmogenic noble gases from these two different lithologies within IAB meteorites will allow a first order estimate about potential differences of production rates in silicate matter (i.e., stony meteorites) and in silicate matter shielded by metal (silicates in IABs). In general, the Fe-shielding will lead to a softer energy spectrum of nuclear active particles, i.e. will increase the flux of low- to medium-energy secondary particles at the expense of high-energy ones [see, e.g., 7, and references therein] and thus for example increase the $^{21}$Ne compared to the $^{22}$Ne production rate. The results will help to expand cosmogenic noble gas applications to meteorite groups such as IAB and IIICD irons, and pallasites.

**Experimental:** Silicate separates consisting of mostly pyroxene and olivine were extracted from silicate inclusions of the IAB iron meteorites Landes and Ocotillo. Samples of Fe, Ni metal were taken in close proximity to the silicate inclusions trying to avoid silicates, and troilite and schreibersite inclusions.

The metal samples are already loaded in an ultra high vacuum system and will be degassed with a RF-heating system. He, Ne, and Ar will be analyzed on two custom-built sector field mass spectrometers connected to the extraction line. Details about the extraction procedure can be found in Ammon and Leya [8]. For Landes and Ocotillo we have performed SEM analyses in order to estimate the amounts of iron, nickel, and sulphur (dissolved in the metal and as small inclusions) in the metal. The latter has been found to be very important in order to correct the data for cosmogenic Ne produced from S [9] which has distinctly higher cross sections than Fe and Ni. Luckily, the metal phases of both Landes and Ocotillo contain only traces of sulfur.

The silicate separates will be degassed with a $CO_2$-Laser and noble gases will be analyzed on a MAP 215-50 mass spectrometer. The extraction line and spectrometer are described in Vogel et al. [10]. The silicate data might need to be corrected for potential trapped components present in the silicates. However, as for example the trapped phase Q is known not to reside in pyroxene and olivine [e.g., 11, 12], and cosmic ray exposure times are long for both meteorites, this correction should not be substantial.

**Outlook:** Besides the general estimate of production rates in metal-shielded silicates, the cosmogenic noble gas measurements in the metal phases of Landes and Ocotillo will help obtaining more precise cosmic ray exposure ages for these meteorites. Existing ages for Landes range from 166 to about 270 Ma [13] and to our knowledge no CREA exists for Ocotillo except our own unpublished preliminary estimate from Ocotillo silicates (in the range of 100 Ma, using production rates for stony meteorites, though). In our case, reliable CREAS are needed for the deconvolution of Ar reservoirs in plagioclase separates from the same meteorites, on which $^{40}$Ar/$^{39}$Ar age determinations have been performed [14]. We anticipate presenting He, Ne, and Ar isotopic and elemental data from silicates and metal from the IAB meteorites Landes and Ocotillo at the time of the conference.

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